

CONCORDIA UNIVERSITY



MECHANICAL ENGINEERING AT CONCORDIA

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DEPARTMENTAL REPORT
1983-1985

DEPARTMENT OF MECHANICAL ENGINEERING

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ACHIEVEMENTS & ACTIVITIES

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Compiled by: 

Dr. T.S. Sankar, Chairman

Mrs. Elizabeth Horwood, Secretary to the Chairman
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MEMBERS OF THE DEPARTMENT AND THEIR RESEARCH INTERESTS

Professor and Chairman of the Department

T.S. Sankar, Ph.D. (Waterloo)
Mechanical Systems, Random Vibrations, Robotics, Reliability

Professors

R.M.H. Cheng, Ph.D. (Birmingham)
Director, Centre for Industrial Control
Control Systems, Automation, Computer Aided Design, Manufacturing and
Robotics

W.G. Habashi, Ph.D. (Cornell)

Aerodynamics, Computational Methods in Fluid Mechanics and
Turbomachines

C.K. Kwok, Ph.D. (McGill)

Fluid Control, Vortex Flows, Combustion

S. Lin, Dr.Ing. (Karlsruhe)

Heat Transfer, Solar Energy Systems

H. McQueen, Ph.D. (Notre Dame)

Social Impacts of Technology, Metallurgy, Manufacturing Processes

M.O.M. Osman, D.Sc.,(Swiss Inst.Tech.)

Mechanisms, Manufacturing Processes, Mechanical Systems

S. Sankar, D.Eng.(Sir George Williams)

Vehicle Dynamic Systems, Vibration Control, Computer-Aided Design and
Optimization

K. Thulasiraman, Ph.D. (I.I.T., Madras)

Graph Theory and Algorithms, Reliability

Associate Professors

R.B. Bhat, Ph.D.,(I.I.T.Madras)

Structural Dynamics, Acoustics, Rotor Dynamics

S.V. Hoa, Ph.D. (Toronto)

Composite Materials, Stress Analysis, Solid Mechanics

K.I. Krakow, M.S. (Caltech)

Heat Pumps, Solar Energy Systems, Heating, Ventilation and
Airconditioning Systems

T. Krepec, Dr.Tech.Sci.(Warsaw)

SAE Faculty Advisor

Internal Combustion Engines, Fuel Control Systems

R.A. Neemen, Ph.D. (McGill)

Gas Dynamics, Shock-Wave Dynamics

Associate Professors (cont'd)

J. Svoboda, D.Eng. (Concordia)

Fluid Power Control, Hydraulics, Flight Simulation

G.D. Xistris, D.Sc.A. (Université de Montréal)

Machinery Preventive Maintenance, Signal Analysis, Solid Mechanics

Assistant Professors

A.E. Blach, Ph.D. (Université de Montréal)

Coordinator, Undergraduate Program

Process Equipment Design, Stress Analysis, Bolted Connections

A. Hemami, Ph.D. (Salford, U.K.)

Robotics, Controls, Tracking Systems

V. Latinovic, D.Eng. (Concordia)

Production, Computer-Aided Manufacturing

A.J. Saber, Ph.D. (Princeton)

Graduate Program Director

Combustion, Propulsion, Environmental Safety Engineering

G. Vatistas, Ph.D. (Concordia)

Flow Instabilities, Gas Turbine Combustion Modelling,

Laminar-Turbulent Flames.

Research Associate Professor

V. Fabrikant, Ph.D. (Moscow)

Classical Mechanics, Contact Problems

Visiting Research Associate

K.Seshadri (Sir Sandford Fleming University)

Visiting Research Assistant Professor

B.Srinivasa Prabhu (Indian Institute of Technology)

International Scientific Exchange Award (NSERC)

Adjunct Professors

G.M. McKinnon, Ph.D. (Saskatchewan)

CAE Electronics Ltd., Montreal

R.V. Dukkipati, Ph.D. (Oklahoma State)

National Research Council, Ottawa

Adjunct Associate Professors

D. Kenny, B.Eng. (McGill)

Pratt & Whitney Aircraft

S. LeQuoc, D.Eng. (Sir George Williams)

Ecole Technologie Supérieure, Université de Québec

D. Mateescu, Ph.D. (Acad of Sc. Romania)

McGill University

M. Samaha, D.Eng. (Concordia University)

Aramco, Saudi Arabia

Adjunct Assistant Professors

M. Attia, Ph.D. (McGill)
Ontario Hydro

W.S. Berczynski, Ph.D. (University of Lodz)
Canadair

C.D. Chomski, Ph.D. (Paris)
Pratt & Whitney Aircraft of Canada

A.E. Fahim, Ph.D. (Concordia)
University of Ottawa

E. Hashish, Ph.D. (Concordia)
Bell Helicopter Textron

A. Satyanarayana, Ph.D. (Jawaharlal Nehru Tech. Univ.)
University of Wisconsin

Research Scientist

Subash Rakheja, Ph.D. (Concordia)

Design Engineer

N. Krouglicof

Full-Time Laboratory Demonstrators

J. Frazao

H. Hong

B. Warner

Research/Teaching Associates

J. Alanoly

C.N. Bapat

J. Bowles

M. Daoud

D. Dmytryw

T. Judek

N. Krouglicof

R. Lee

I. Lulham

P. Ouellette

S. Rakheja

M. Surpceanu

B. Suresh

G. Vadavia

M. Van Vliet

R. Warner

G. Lasnier

S. Petruzzello

F. Medina

R. Terasci

Part Time Teaching Assistants

W.K. Ahmed

G. Guevremont

S. Mah

B. Nguyen

V. Tata

Cong Hiep To

Technical Staff

M. Brennan

J. Elliott

W. Fitch

F. Marsman

S. Williams

P. Favreau

Secretarial Staff

P. Baktis (Research)

J. Claassen

I. Crawford

E. Horwood

B. Keshavan

C. Nadeau

N. Nicholson (Research)

L. Palazzo (Research)

HIGHLIGHTS

NOTABLE AWARDS

STUDENTS

Gregor Rohrauer - R.L. Weldon Scholarship (1984-85).
Gregor Rohrauer - Ordre des ingénieurs prize for outstanding academic performance and personal qualities (1985).
Gregor Rohrauer - Mechanical Engineering Medal (1985).
David Wilson - James McQueen Scholarship (1984-85).
Ramy Issa - Alcan Prize for best design with social merit, Quebec Design Competition (1985).
Student Project - 3rd prize, CSME National Engineering Design Competition (1985).
Irwin Ma - Silas Katz Memorial Scholarship (1984-85).
Mechanical Engineering Students - Best performance in three categories SAE Mini-Baja Competition in Vehicle Design (1985).
14 Undergraduate Students - NSERC Summer Undergraduate Awards (1985).
5 Graduate Students - NSERC Postgraduate Fellowships (1984-85).
8 Graduate Students - FCAR Postgraduate Bursaries (1984-85).
12 Graduate Students - Presented research papers at international conferences (1984-85).

FACULTY AND DEPARTMENT

The Department of Mechanical Engineering was awarded \$21,126 by the Challenge'85 program of the Government of Canada to create 10 student summer jobs.

A Mechanical Engineering Research Team, headed by Dr. Seshadri Sankar, was awarded \$1,161,782 by the Government of Quebec, Minister of Science and Technology under their program d'Action Structurantes to establish Concordia Computer Aided Vehicle Engineering (CONCAVE) research centre (1985).

Microcomputer systems with peripherals and softwares were donated by INTEL Company to four faculty members (1985).

Dr. S. Lin was awarded an NSERC Senior Industrial Fellowship to work with QIT-Fer et Titane Inc., Sorel (1984-85).

The Department rated as one of the country's highest per capita recipients of NSERC Operating Grants and was awarded other NSERC grants, namely Strategic, PRAI, Infrastructure, Equipment, Conference, and an International Scientific Exchange Award.

Faculty Members of the Department also received FCAR (Quebec) grants and numerous industrial grants and contracts.

OTHER DISTINCTIONS

Dr. H. McQueen, Chairman of the 7th International Conference on the Strength of Metals and Alloys, Concordia University, August 1985, 500 delegates.

Dr. T.S. Sankar, at the invitation of the Government of the People's Republic Republic of China, in November 1984 visited several institutions and government agencies to set up collaborative research and educational exchanges.

OTHER DISTINCTIONS (cont'd)

Dr. T.S. Sankar, at the request of the Government of Quebec, joined a delegation of CAMAQ representatives to visit and to initiate multiprogram cooperation with Bell Helicopter Textron in Fort Worth, Texas.

Dr. T. Krepec is a member of the Selection Committee for France-Quebec Cooperative Programs.

Dr. Seshadri Sankar was Co-Chairman and Technical Program Chairman of the 2nd Canadian Universities Conference on CAD/CAM, May 1985.

Dr. T.S. Sankar was a recipient of the John W. O'Brien Distinguished Teaching Award presented at the 1985 Convocation.

The Department successfully obtained CAA Accreditation with impressive remarks on the quality of its B.Eng. program.

The second inter-university appointment of a faculty member based at Concordia was arranged under the tri-university cooperative M.Eng. program in the Aeronautical option.

Mechanical Engineering students Marek and Rafal Krepec donated \$3,000 to the Concordia Capital Campaign from funds they earned developing software "PCjr Color Paint" for IBM.

Dr. M.O.M. Osman contributed a chapter on "Drill" to The World Book Encyclopedia, Scott & Fetzer Co., U.S.A., 1965.

Dr. W.G. Habashi is the editor of Advances in Computational Transonic and Viscous Flows in Computational Methods, both published by Pineridge Press, Swansea, U.K.

Dr. Seshadri Sankar contributed a chapter on "Simulation of Mechanical Systems" to Encyclopedia of Systems and Controls to appear in 1985.

Dr. T.S. Sankar was awarded the CSME Special Certificate of Merit and Service at the 1985 Annual General Honours and Awards Meeting.

Dr. R.B. Bhat received an award from NASA Langley Research Center for his technical innovation "PROSS-PROGRAMMING STRUCTURED SYNTHESIS SYSTEM", 1983.

GENERAL INFORMATION

FACULTY AND STAFF

The Mechanical Engineering Faculty is comprised of 9 professors, 7 Associate Professors, 5 Assistant Professors and several Visiting and Adjunct Professors, Research Associates and Lecturers, 4 Technical Staff, and 5 Secretaries. The faculty members are engaged in industrial as well as academic research and development; and many have gained an international reputation. There is considerable cooperation and interaction with industry. To further this cooperation many specialist courses are taught by practicing engineers and a number of faculty members act as consultants to industry. Pages 3,4,5,6,7, 8 and 9 describe the major research groups and typical projects in the Department.

LABORATORY FACILITIES

- 1) Thermodynamics Laboratory.
- 2) Fluid Mechanics and Heat Transfer Laboratory.
- 3) Kinematics and Dynamics Laboratory.
- 4) Vibration and Shock Testing Laboratory.
- 5) Machine Tool Laboratory.
- 6) Fluid Power Laboratory.
- 7) Tribology Laboratory with Talysurf and Talyrand Surface Texture Measuring Systems.
- 8) Industrial Control Research Laboratory.
- 9) Control Systems and Automation Laboratory.
- 10) Materials Laboratory.
- 11) Solar Energy Laboratory.
- 12) Instrumentation and Measurements Laboratory.
- 13) Computer Aided Design and Interactive Graphics Laboratory.

SUPPORTING FACILITIES

- 1) A well equipped precision Machine Shop staffed by 7 full-time machinists.
- 2) Central CDC CYBER 835 time sharing main frame. A separate pamphlet describing the hardware and software is available from the Computer Center.
- 3) Hybrid computer lab with an EAI 690 system staffed by a full-time simulation engineer and a technical assistant.
- 4) A dedicated VAX 11/780 computer with 4MB of core memory, two cartridge disk drives (28 MB each), and an additional Winchester disk drive of 675 MB; a Kennedy 800/1600 BPI magnetic tape drive and a NORPAK/VDP high performance, raster scan color video graphic system; a CALCOMP model 1012, 12" drum plotter; a tektronix model 4663, flat bed plotter; several CRT's, micros; Versatec plotter; Autotrol CAD system.

MECHANICAL SYSTEMS

DESCRIPTION: Research work in mechanical systems at Concordia incorporates vibrations, machine tools, system design, mechanisms, noise analysis, preventive maintenance, computer-aided design and composite materials.

SCOPE OF WORK: Research, development, design with emphasis on production machinery and industrial applications.

FACILITIES: Fully instrumented Machine Tool Laboratory; Mechanical Vibrations Laboratory with 100 lb shaker system; low frequency, long stroke electro-hydraulic shaker; fully instrumented for noise and vibration analysis and shock testing; Measuring Laboratory with Taly-surf 4 and Talyrand 51; Kinematics and Dynamics Laboratory; hybrid computing system with direct link to laboratories; deep-hole machining and hydraulic copying research facilities; digital (CDC CYBER 835) and hybrid computers. Complete 2 channel real time FTT analyzer and modal analysis system with all supporting softwares. Acoustic emission test equipment, MTS fatigue tester, photoelastic polariscopes and strain gage instrumentation.

FACULTY:	M.O.M. Osman, Dr.Sc Techn. (Swiss Fed. Institute)	Machine Tool Dynamics, Tribology Metal Cutting, Mechanisms & Gear Transmissions.
	T.S. Sankar, Ph.D. (Waterloo)	Mechanics, Vibration Problems in Mechanical Systems and Reliability, Biomedical applications
	G.D. Xistris, D.Sc.A. (Université de Montréal)	Machinery Reliability, Noise and Vibrations and Signal Processing.
	S. Sankar, D.Eng. (Sir George Williams)	Computer-Aided Design, Vehicle Dynamics, Optimization and Vibration Control in System Design.
	S.V. Hoa, Ph.D. (Toronto)	Vibration, Stress Analysis, Composite Materials, Finite Element Method.
	A.E. Blach, Ph.D. (Université de Montréal)	Stress Analysis, Pressure Vessels and Piping, Heat Exchanger Design.
	R.B. Bhat, Ph.D. (I.I.T., Madras)	Random Vibrations, Rotor Dynamics, Structural Acoustics.
TYPICAL PROJECTS:	Monitoring and analyzing noise and vibrations of industrial machinery, including thermal and vibratory stresses; preventive maintenance routines; analysis and design of energy absorption	

devices for critical vibrations in machinery elements; unbalance response in rotating machinery; short-time acceptance tests for machine tools; evaluation of surface roughness of manufactured components and its influence on properties such as fatigue, bearing strength, lubricability, etc.; off-road vehicle seat suspension; active and semi-active suspension; motorcycle shock absorbers; CAD of complex mechanical systems through interactive graphics and Finite Element analysis; composite materials applications; fiberglass reinforced plastic pressure vessels; high damping composite materials.

THERMO-FLUID POWER AND PROPULSION

DESCRIPTION: Research encompasses experimental, analytical and computational work in combustion, solar energy, heat transfer, aerodynamics of turbomachinery.

SCOPE OF WORK: Development of modern computational techniques for the analysis of gas dynamic and transonic aerodynamic phenomena, especially in gas turbines and rocket motors; analysis and testing of phase-change, heat transfer processes; design and testing of solar heating and cooling systems; numerical methods in unsteady compressible flow; analysis of implosions, explosions and stability of moving shock waves.

FACILITIES: Wind Tunnels, Fluid Dynamics Laboratory; Thermodynamics Laboratory; Heat Transfer Laboratory; Solar Research Laboratory; Heat Pump Laboratory; Digital Computer and Terminal facilities, CDC CYBER 835; Combustion Laboratory; Shock Wave Dynamics Laboratory and associated instrumentations.

FACULTY:	W.G. Habashi, Ph.D. (Cornell)	Finite Element Applications in Aerodynamics, Computational Methods in Turbomachinery.
	K.I. Krakow, M.S. (Cal. Tech.)	Environmental Control, Solar Energy.
	S. Lin, D-Ing. (Karlsruhe)	Solar Energy, Heat and Mass Transfer Processes.
	R.A. Neemeh, Ph.D. (McGill)	Shock Wave Physics and Related Phenomena, Unsteady Wave Motion in Compressible Flow.
	A.J. Saber, Ph.D. (Princeton)	Study of Experimental Methods in Coal Gasification, Rocket Motor Instabilities.
	G. Vatisas, Ph.D. (Concordia)	Vortex Dynamics and Flow Instabilities, Finite Difference Applications in Combustion Aerodynamics.

TYPICAL PROJECTS: Finite element computational study of aerodynamic flows at high subsonic and transonic Mach numbers; study of acoustic and structural phenomena in solid propellant rocket motors; resonance phenomena and their application; numerical methods in aerodynamics of turbomachines; air and solar source heat pumps; heat and mass transfer in porous media; energy transfer in confined vortex flows; ignition of gaseous mixtures by shock waves; testing of supersonic flow in compressor cascades; plasma dynamics.

INDUSTRIAL CONTROL SYSTEMS

DESCRIPTION: Industrial Control Systems incorporate pneumatics, fluidics, hydraulics, electronics and control engineering.

SCOPE OF WORK: Research, development, design and simulation with emphasis on sensing, measurement, automation and control applications in industry; low-cost automation with emphasis on production operation, mechanical transfer and handling; special purpose industrial "robots"; application of control theory and computer methods to the design and analysis of industrial control systems; computer-aided design interactive simulation.

FACILITIES: Well equipped research laboratory; experienced staff with design and prototype capability; low-cost automation laboratory open to industry contains about 30 working circuits of typical industrial applications to demonstrate the advantages and potential of new technology; digital and hybrid computer facilities.

FACULTY:	C.Kwok, Ph.D. (McGill)	Pneumatic and Fluidic Systems, Fluid Dynamics and Design.
	R.M.H. Cheng, Ph.D. (Birmingham)	Design and Analysis of Automation and Control Systems.
	J. Svoboda, D.Eng. (Concordia)	Fluid Controls, Hydraulic Systems and Flight Simulators.
	T. Krepec, D.T.Sc. (Warsaw)	Fuel Control Systems, Internal Combustion Engines.
	Y. Stepanenko, Ph.D. (Moscow)	Robotics

MATERIALS IN MANUFACTURING

DESCRIPTION & SCOPE OF WORK:	Hot working of metals encompasses the microstructural changes taking place inside the metals; the ductility and strength of various alloys; the simulation of multistage rolling and forging and the product properties. Mechanical behavior of fiber reinforced plastic composites; fatigue, fracture, creep and effect of environments; analysis using finite element method.	
FACILITIES:	Compression and torsion tests by means of microprocessor controlled equipment; optical and electron microscopy. Composite materials fabrication equipment; MTS fatigue testing machine, environmental chamber, photoelastic polariscope.	
FACULTY:	H.J. McQueen, Ph.D. (Notre Dame)	Hot Working of Metals, Energy Conversion in Manufacturing, Energy Strategy, Solar Materials
	S.V. Hoa, Ph.D. (Toronto)	Composite Materials, Stress Analysis, Dynamics.
TYPICAL PROJECTS:	Simulation of a hot reversing mill with up-coil furnaces; measurement and flow stress during passes and of softening between passes for both carbon steels and new high strength low-alloy steels. Fatigue and fracture of sheet molding components; fatigue and fracture of graphite/epoxy composites; effect of stress concentration on fracture strength of composite under uniaxial and biaxial loadings; effect of water absorption on the mechanical behavior of SMC and of graphite/epoxy composites; design methodology.	

INDUSTRIAL ENGINEERING AND RELIABILITY IN SYSTEMS

DESCRIPTION: Research involves (i) development of efficient computational techniques for solving industrial engineering problems; (ii) modeling and performance evaluation of large industrial systems and (iii) reliability problems in systems.

SCOPE OF WORK: (i) Design, mathematical analysis and experimental evaluation of graph and discrete optimization algorithms for problems arising in industrial applications. These problems include: scheduling and sequencing of jobs, network reliability analysis, vehicle routing such as the travelling salesman problem, circuit lay-out, etc.... (ii) Studies in queuing networks and queuing network modeling of large systems such as computer systems. (iii) Investigation of reliability of mechanical systems using direct and indirect methods.

FACULTY:	K. Thulasiraman, Ph.D. (I.I.T., Madras)	Graph Theory, Discrete Optimization and Algorithms, Networks and Systems Theory.
	T.S. Sankar, Ph.D. (Waterloo)	Reliability Analysis and Mechanical Systems.
	M.N.S. Swamy, Ph.D. (Saskatchewan)	Graph Theory, Signal Processing, Networks and Systems Theory.

TYPICAL PROJECTS: Optimal planar circuit layout; time-table and task scheduling; travelling salesman and routing problems; assembly-line balancing; topological design of computer networks; flow control problems in computer networks; probabilistic methods for reliability estimations for industrial machinery and production lines; failure forecasts for equipment and operation.

COMPUTER AIDED DESIGN, MANUFACTURING AND ROBOTICS

DESCRIPTION: CAD/CAM and Robotics is a developing area in Mechanical Engineering which deals with the use of micro-, mini- and large computers in the analysis, design and optimization of mechanical components and systems for application.

SCOPE OF WORK: Research, development, automated design, automated manufacturing, robotics and manipulators, vehicle design, simulation of industrial products.

FACILITIES: A dedicated VAX 11/780 computer with 4MB of core memory, two cartridge disk drives (28 MB each), and an additional Winchester disk drive of 675 MB; a Kennedy 800/1600 BPI magnetic tape drive and a NORPAK/VDP high performance, raster scan color video graphic system; a CALCOMP model 1012, 12" drum plotter; a tektronix model 4663, flat bed plotter; Versatec plotter and several CRT's.

FACULTY:	S. Sankar, D. Eng. (Sir George Williams)	Computer Aided Design of Mechanical System, Dynamic Graphics in Vehicle Design, Optimal Design.
	R.M.H. Cheng, Ph.D. (Birmingham, U.K.)	Computer Aided Design of Fluid Systems, Automation, Robotics.
	V. Latinovic, D.Eng. (Concordia)	Computer Aided Manufacturing, Production Technology, Graphics.
	Y. Stepanenko, Ph.D. (Moscow)	Robotics and Manipulators, Simulation Methodologies.
	A. Hemami, Ph.D. (Salford)	Robotics and Manipulators, Simulation Methodologies, Controls.

TYPICAL PROJECTS:

- (i) Computer aided optimal design of transportation systems with reference to vehicle suspension performance.
- (ii) Finite element analysis and dynamic graphics in the design of off-road vehicle structures.
- (iii) CAD of sequential circuits for industrial processes.
- (iv) CAD of complex mechanical systems through interactive graphics and analysis.
- (v) CAD of rotor-bearing systems.
- (vi) CAD of pneumatic stepper motors and circuits.
- (vii) CAD of fiberglass reinforced plastic pressure vessels.
- (viii) CAD of industrial robots.
- (ix) Computer controlled compliance robots.
- (x) CADD scheduling, automated tolerancing.
- (xi) Robotic devices for handicapped.

PUBLICATIONS IN REFEREEED JOURNALS (June 1, 1983-May 31, 1985).

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Bahgat, B.M., M.O.M. Osman and R.V. Dukkipati, "On the Dynamic Gear Tooth Loading of Planetary Gearing as Affected by Bearing Clearances in High Speed Machinery", ASME Transactions, Journal of Mechanisms, Transmissions and Automation Design, in press, accepted July 1984.

Bapat, C.N. and S. Sankar, "Exact Analysis of Oscillator Hitting a Stop", ASME Transactions, Journal of Vibration, Acoustics, Stress and Reliability in Design (accepted for publication on January 4, 1985.)

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Bapat, C.N. and S. Sankar, "Multi-Unit Impact Damper - Reexamined", Journal of Sound and Vibration, Vol. 102, No. 4, 22 Oct. 1985.

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Bhat, R.B., R. Subbiah and T.S. Sankar, "Dynamic Behaviour of a Simple Rotor with Dissimilar Hydrodynamic Bearings by Modal Analysis", Transactions ASME Vol. 107, 1985, pp. 267-269.

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Bhat, R.B., "Obtaining Natural Frequencies of Elastic Systems by Using an Improved Strain Energy Formulation in the Rayleigh-Ritz Method", Journal of Sound and Vibration, Vol. 93, No. 1, 1984.

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Bhat, R.B., "Plate Deflections using Orthogonal Polynomials", Engineering Mechanics, Trans. ASCE, Accepted for Publication, March 19, 1985.

Bhat, R.B., "Component Mode Synthesis in Modal Testing of Structures", Journal of Sound and Vibration, Vol. 101, No. 3, 1985.

Blach, A.E., A. Bazergui and R. Baldur, "Bolted Flanged Connections with Full Face Gaskets", Welding Research Council Bulletin, in press, accepted 1985.

Breitman, D.S., E.G. Dueck and W.G. Habashi, "Finite Element Analysis of a Split-Flow Particle Separator", Journal of Aircraft, AIAA Journal, Vol. 22, No. 2, February 1985, pp. 135-140.

Brunn, P., V.I. Fabrikant and T.S. Sankar, "Diffusion Through Membranes: Effect of a Nonzero Membrane Thickness", Quarterly Journal of Mechanics and Applied Mathematics (in press), 1983.

Bush, G., M.O.M. Osman and S. Sankar, "On the Optimal Design of Multi-Speed Gear Trains," Journal of Mechanism and Machine Theory, Vol. 19, No. 2, 1984, pp. 183-195.

Chandrashekhar, M.O.M. Osman and T.S. Sankar, "An Analytical Time Domain Evaluation of the Cutting Forces in BTA Deep-Hole Macnining using the Thin Shear Plane Model", International Journal of Production Research, Vol. 22, No. 4, 1984, pp. 697-721.

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Fabrikant, V.I. and L.M. Keer, "The Interaction Between a System of Circular Punches on a Nonhomogeneous Elastic Half-Space", International Journal of Mechanical Science, Vol. 25, No. 7, 1983, pp. 513-518.

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Habashi, W.G., P.L. Kotiuga and L. McLean, "Finite Element Simulation of Transonic Flows by Modified Potential and Stream Function Methods", *Engineering Analysis*, Vol. 2, No. 3, 1985, pp. 150-154.

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Hashish, E. and T.S. Sankar, "Modal Analysis and Error Estimates for Linearized Finite Journal Bearings", *ASME Transactions, Journal of Vibrations, Acoustics, Stress and Reliability in Design*, Vol. 106, No. 1, January 1984, pp. 100-106.

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Sasiadek, J. and C.K. Kwok, "Numerical Solution of 2-Dimensional Heat Conduction Equation with Internal Heat Source Applied to Nuclear Fuel Rods", Proceedings of the International Conference on Numerical Methods in Thermal Problems, Seattle, N.J., August 1983, pp. 47-54.

Selvakumar, A., M.O.H. Osman and T.S. Sankar, "An Automatic Gear Mesh Generator (AGMG) for Finite Element Modelling of Spur and Helical Gears", ASME National Design Engineering Conference, Chicago, Illinois, March 11-13, Paper No. 85-DE-6.

Selvakumar, A., T.S. Sankar and M.O.M. Osman, "On the Dynamic Tooth Load and Stability of a Spur Gear System Using the State Space Approach", ASME Fourth International Power Transmission and Gear Conference, Cambridge, Mass. Oct. October 10-12, 1984, Paper No. 84-DET-212.

Sharan, A.M., T.S. Sankar and S. Sankar, "Analysis and Optimization of a Randomly Excited Machine Tool Spindle for Minimum Flexural Response", Proceedings of the Sixth World Congress on Theory of Machines and Mechanisms, IFToMM, New Delhi, December 1983.

Stepanenko, Y. and T.S. Sankar, "On the Accuracy of Force-Reflecting Master-Slave Manipulators for Hazardous Environment", Proceedings of the CSME Annual Conference and National Engineering Conferences, Halifax, May 1984.

Subbiah, R., R.B. Bhat and T.S. Sankar, "Experimental Study of Unbalance Response of Rotor Mounted on Dissimilar Hydrodynamic Bearings", Proceedings Sixth World Congress on Theory of Machines and Mechanisms, IFTOMM, New Delhi, December 1983.

Subbiah, R., R.B. Bhat and T.S. Sankar, "Modal Parameter Identification in Rotors Supported on Hydrodynamic Bearings", Eighth Machinery Dynamics Seminar, Halifax, N.S., October 1-2, 1984.

Subbiah, R., R.B. Bhat and T.S. Sankar, "Dynamics of Rotors with Rotational Film Coefficients in Finite Cylindrical Bearings", 10th Canadian Congress of Applied Mechanics, London, Ontario, June 2-7, 1985.

Subbiah, R., R.B. Bhat, T.S. Sankar and J.S. Rao, "Backward Whirl in a Single Rotor Supported on Hydrodynamic Bearings", Symposium on Instability in Rotating Machinery, Carson City, Nevada, June 10-14, 1985.

Sulmistras, A., I.O. Moen and A.J. Saber, "Detonations in Hydrogen Sulphide-Air Clouds with Comparisons to Other Fuel-Air Mixtures", Joint Technical Meeting, Central and Western States Section, The Combustion Institute, San Antonio, Texas, April 22-23, 1985.

Svoboda, J. and M. McKinnon, "Flight Simulation Research at Concordia", Canadian Aeronautics and Space Institute Annual Symposium, Ottawa, May 1984.

Svoboda, J., M. McKinnon, W. Blach and W. Fitcn, "Development of Light Aircraft Flight Simulator", Canadian Industrial Computer Society Symposium, Ottawa, May 1984.

To, C.H. and T. Krepec, "Use of Computers in Optimization of Diesel Injector's Design", Proceedings Second Canadian Universities Conference on CAD/CAM, Ecole Polytechnique, Montreal, May 1985, pp. 23-31.

Turaga, M., S. Lin and P. Fazio, "Simulation Method for the Performance of Direct Expansion Air-Cooling and Dehumidifying Coils", Proceedings of the Workshop on HVAC Controls Modeling and Simulation, Atlanta, Georgia, Feb. 2-3, 1984.

Van Vliet, M., S. Rakheja and S. Sankar, "An Efficient Algorithm for the Simulation of Nonlinear Vehicle Suspension", International Computers in Engineering Conference and Exhibit, Las Vegas, September 1984.

Van Vliet, M. and M. McKinnon, "An Anti-Vibration Seat for Helicopters", Canadian Aeronautic and Space Institute Annual Conference, Montreal, April 1985.

Van Vliet, M., S. Rakheja and S. Sankar, "An Efficient Algorithm for the Simulation of Nonlinear Vehicle Suspension", SAE International Off-Highway & Powerplant Congress & Exposition, Milwaukee, Wisconsin, September 10-13, 1984.

Van Vliet, M. and S. Sankar, "Frequency and Time Domain Analysis of Off-Road Motorcycle Suspension", The 53rd Shock and Vibration Symposium, Boston, October 1983.

Vatistas, G.H., S. Lin and C.K. Kwok, "An Analytical and Experimental Study of the Core-size and Pressure Drop Across a Vortex Chamber", AIAA-84-1548, paper presented at AIAA 17th Fluid Dynamics, Plasma Dynamics, and Laser Conference, Snowmass, Col., June 25-27, 1984.

Vatistas, G.H., C.K. Kwok and J. Monioudis, "The Dynamics of Free Falling Spheres in Viscous Fluids", Proceedings of the Tenth Canadian Congress of Applied Mechanics, No. B67-68, University of Western Ontario, June 1985.

Vatistas, G.H., C.K. Kwok, S. Lin and A. Georgantas, "Mean Flowfields in a Cyclone Chamber", Proceedings of the Tenth Canadian Congress of Applied Mechanics, No. C73-74, University of Western Ontario, June 1985.

Xistris, G.D., "On the Effectiveness of Maintenance Programs and Policies for Shipboard Machinery", Condition Monitoring '84, Proceedings, Swansea, U.K., pp.55-56, April 1984.

PROFESSIONAL ACTIVITIES

BHAT, R.B.

Reviewer of papers for Journal of Sound and Vibration, IFToMM Congress 83 and ASME Winter Annual Meeting 1984.
Alternate Member, Canadian Machinery Dynamics Subcommittee.
Invited lecturer Clarkson College of Technology, Potsdam, N.Y.
Invited lecturer Spar Aerospace Limited, Montreal.
Invited lecturer K.R. Engineering College, Srinivasanagar, India.
Member, American Society for Engineering Education
Member, American Society of Mechanical Engineers.
Member, Canadian Acoustical Association.
Fellow, Institution of Engineers (India).

BLACH, A.E.

Member, Ordre des Ingénieurs du Québec.
Member, Canadian Society for Mechanical Engineers.
Member, Grant Selection Committee, Institut de Recherche en Santé et
Member, American Society of Mechanical Engineers.
Served on Subcommittee on Bolted Flanged Connections, welding Research
Council.
Member, CIDA team to establish Industrial Engineering Staff Training
Program at University of West Indies.
Member, Pressure Vessel Research Committee of the Welding Research
Council Subcommittee on Bolted Flanged Connections.
Member ELSPI Subcommittee on CEGEP Science Program.
Member Grant Selection Committee IRSST (Institut de Recherche en
Santé et en sécurité du travail du Québec).
Member, Deans Committee (Engineering) on CEGEP Science Program.
Les Publications L'Ingenieur, Conseil d'Administration.
1975 to date - Consulting services for piping, pressure vessel and
process equipment design.
Consulting services for power, petrochemical and pulp and paper
industries.

CHENG, R.M.H.

Member, Institution of Mechanical Engineers.
Senior Member, Instrument Society of America.
Member, American Society of Mechanical Engineers.
Member, Institute of Electrical and Electronics Engineers.
Reviewer of papers for ASME and IEEE Transactions.
Member, Technical Committee IEEE on Control Theory.
Consultant, DSL-Dynamic Sciences Limited.

HABASHI, W.G.

Aerodynamics Consultant, Pratt & Whitney Canada Ltd., Longueuil, Qué.
Member, Ordre des Ingénieurs du Québec.
Member (elected), Sigma-Xi, Scientific Research Society of North
America.

Member, The American Society of Mechanical Engineers.
Member, The American Institute of Aeronautics and Astronautics.
Member, CAMAQ Committee, and CAMAQ Subcommittee on Joint M.Eng.
Program in Aerospace Engineering.
Board Member (John Wiley) International Journal for Numerical Methods
in Fluids.
Reviewer of papers for AIAA Journal, International Journal for
Numerical Methods in Engineering, (John Wiley), CASI Transactions, CSME
International Journal for Numerical Methods in Fluids (John
Wiley), Organizing Committee, Third International Conference on
Numerical Methods in Laminar and Turbulent Flow, Seattle, Washington,
August 1983.
Organizing Committee, Second International Conference on Computational
Methods and Experimental Methods, Queen Elizabeth II, New York to
Southampton, June 1984.
Reviewer Journal of Fluids Engineering (ASME)
Reviewer Computer and Fluids Journal.
Reviewer Canadian Congress of Applied Mechanics.
Reviewer Heat Transfer and Fluid Mechanics Institute.
Coordinator, Tri-University Master of Aerospace Engineering Program

HOA, S.V.

Member, ASME Boiler and Pressure Vessel Code, Section X Committee.
Reviewer of papers for Journal of Polymer Composites, Polymer Science
and Engineering, AIAA, Journal of Sound and Vibration, Zentralblatt
fur Mathematik.
Member, Organizing Committee, 7th International Conference on the
Strength of Metals and Alloys, to be held at Concordia University,
Montreal, 1985.
Consultant for CPF Dualam Ltd., Voyageur Marine Construction Ltd., Q
Plast Inc., Spar Aerospace Ltd., Innotech Aviation Ltd.
Scientific Advisor for PILP Grant, ABCO Plastics Ltd., Mahone Bay,
Nova Scotia.

KRAKOW, K.I.

Examiner for Order of Engineers of Quebec.
Member, Order of Engineers of Quebec.
Member, American Society of Heating Ventilating and Air Conditioning
Engineers.
Member, American Society of Mechanical Engineers.

KREPEC, T.

Member, Order of Engineers of Quebec.
Member, Selection Committee for France-Quebec Cooperative Programs.
Faculty Advisor for Concordia Student Branch, Society of Automotive
Engineers.
Member, Society of Automotive Engineers
Member, Combustion Institute
Member, International Association for Hydrogen Energy
Consultant for MARK, Inc., Montreal.

KWOK, C.K.

Member, Ordre des ingénieurs du Québec.
Member, American Society of Mechanical Engineers.

LATINOVIC, V.

Member, Ordre des Ingénieurs du Québec.
Member, American Society of Mechanical Engineering.
Member, Society of Manufacturing Engineers.
Member, American Society of Engineering Education.

LIN, S.

Member, Ordre des Ingénieurs du Québec.
Member, Engineering Institute of Canada.
Member, Canadian Society for Mechanical Engineering.
Member, Deutsche Gesellschaft fur Luft-und-Raumfahrt e.V.
Member, American Society of Heating, Refrigerating and Air-Conditioning Engineers.
Member, International Solar Energy Society.
External Examiner, Ph.D. Thesis for Ecole Polytechnique, Montreal.
Reviewer of research projects for National Science Foundation, U.S.A.
Reviewer of papers for Journal of Heat Transfer and Petroleum Division of ASME.
Consultant on various Heat Pump projects.
Senior Visiting Scientist, QIT-Fer et Titane Inc., Sorel, Quebec.

MCQUEEN, H.J.

Recipient of NSERC Sabbatical Travel Grant, 1984.
Collaborative research, Dept. of Physics, Univ. of Bologna.
Recipient 6 month DFG sabbatical grant for research in rolling and crystallographic textures at the Tech. Univ. of Hamburg-Harburg, 1984.
Recipient 4 month sabbatical grant from the science research council of Norway for research in hot working of aluminum of steel at NTH Trondheim, 1984.
Reviewer of research grant applications submitted to National Science Foundation, U.S.A.
Chairman, Organizing Committee, 7th International Conference on the Strength of Metals and Alloys, Montreal, August 12-16, 1985.

NEEMEH, R.A.

Consultant, Iron Ore Company of Canada Ltd.
Member, Senate Library Committee, Concordia University.
Member of AIAA.

OSMAN, M.O.M.

Member, Executive Council of IFTOMM.
Member, Editorial Board, CSME-Transactions.
Reviewer of Papers for AMR, ASME, CSME-Transactions and Journal of Machines and Mechanisms.
Founder and Chairman, Canadian Council for Theory of Machines and Mechanisms (CCToMM).
Consultant, Hydro-Ontario, Toronto.

SABER, A.J.

Member, Board of Directors, Lignasco Resources Ltd., Toronto.
Member, Board of Directors, Kaolin of Canada Ltd.
Consultant, DRES, Suffield, Ralston, Alberta.
Consultant, Donald R. Martyn and Associates, Toronto.

SANKAR, S.

Associate Editor, Simulation Journal.
Reviewer, Zentralblatt for Mathematik, Simulation Journal, ASME and CSME Transactions and Conferences, CANCAM Conferences, Shock and Vibration Bulletin and Conference.
Co-Chairman and Technical Program Chairman, 2nd Canadian Universities Conference on CAD/CAM, Ecole Polytechnique, May 9-10, 1985.
President, The International Society for Mathematics and Computers in Simulation (IMACS/CANADA).
NSERC Industrial Fellow at Bombardier Inc., (1983-84).
Technical Advisor, Recreational and Industrial Product Division, Bombardier Inc.
Session Chairman & Vice-Chairman, 9th ASME Design Automation Conference, Dearborn, September 1983.
Session Chairman & Vice-Chairman, 9th CANCAM Conference, Saskatoon, Sask., May 1983.
Member, Vehicle Dynamics Advisory Committee, RTAC.ATRC.
Invited Seminar, Lakehead University, November 1983.
Invited Lecture Series on CAD - Jawaharlal Nehru Technological University, India, February 1984.
Special Seminars presented at Indian Institute of Technology (IIT) Madras, IIT Bombay, National Institute for Training Industrial Engineers, Osmania University, Anna University, Bharat Heavy Electricals Ltd., Defense Research Development Labs, Madras Institute of Technology, Government College of Technology - Combatore, India February-March 1984.
Consultant, Bombardier Inc., VIA RAIL.

SANKAR, T.S.

Reviewer of Papers, Canadian Congress of Applied Mechanics, ASME Conferences and Transactions, Journal of Sound and Vibrations, CSME Transactions, IFToMM.
Reviewer, Shock and Vibration Bulletin and Conferences.
Reviewer, Research Proposals for National Science Foundation, U.S.A.
Member, Editorial Board, International Journal of Diagnostic Engineering, U.K.
Consultant, Separator Engineering Ltd.; National Research Council of Canada; ABCO Plastics Ltd; Government of India.
Session Chairman, Session Coordinator and Paper Review, 8th Vibrations Conference of the ASME, Dearborn, September 1983.
Session Chairman and Session Coordinator, Sixth IFToMM World Congress New Delhi, December 1983.
Head, Canadian Delegation, Sixth IFToMM World Congress, New Delhi, December 1983.

Invited talks in Europe and Asia, July 1983.

Member, NRC Subcommittee on Turbomechanics and Machinery Dynamics, 1977 to date.

Member, Mechanisms Committee, ASME, 1977-80, and Member, Vibrations Committee, ASME, 1979 to date.

Chairman, Machinery Dynamics Subcommittee of NRC.

Member, Associate Committee on Propulsion, National Research Council.

SVOBODA, J.

Director, Festo Pneumatic, West Germany.

Assessor, Australian Research Committee.

Consultant, Ritepro Inc., National Engineering Laboratory, U.K., and Festo-Pneumatic, West Germany.

THULASIRAMAN, K.

Reviewer, Mathematical Reviews, U.S.A.

Reviewer of papers for IEEE Transactions on Circuits and Systems, Canadian Electrical Engineering Journal.

Examiner, Ph.D. Thesis, Indian Institute of Technology, Bombay, India.

Member, Technical Program Committee, IEEE International Symposium on Circuits and Systems, 1984.

VATISTAS, G.

Member, American Institute of Aeronautics and Astronautics.

Member, Canadian Aeronautics and Space Institute.

Member, Committee on Computers in Energy Systems, ASME.

Reviewer, ASME International Conference on Computers in Engineering

Consultant, Royal Victoria Hospital Department of Surgery.

Invited speaker on Confined Vortex Flows, University of New Brunswick.

Session Organizer and Chairman, Computers in Energy Systems, 1984

ASME International Computers in Engineering Conference and Exhibit.

XISTRIS, G.

Member, Ordre des ingénieurs du Québec.

Member, American Society of Mechanical Engineers.

Member, American Society for Engineering Education.

Member, Comité des examinatons (OIQ).

Reviewer, ASME Transactions and Conferences.

Consultant to Department of National Defence (DND-Navy), Maritime Command (MARCOM-Fleet Training School), Peacock, Inc. and Commission de la santé et de la sécurité au travail du Québec (Industrial Noise and Vibration).

Session Chairman, Sixth IFToMM World Congress, New Delhi, India and Condition Monitoring '84, Swansea, U.K.

DOCTORAL THESES COMPLETED (June 1, 1983 to May 31, 1985)

RAKHEJA, S. "Computer Aided Dynamic Analysis and Optimal Design of Suspension Systems for Off-Road Tractors", 1983. (Supervisor: Dr. S. Sankar).

VAN VLIET, M. "Computer Aided Analysis and Design of Off-Road Motorcycle Suspensions", 1983. (Supervisor: Dr. S. Sankar).

VATISTAS, G. "Theoretical and Experimental Studies on Confined Vortex Flows", 1984. (Supervisors: Dr. Sui Lin and Dr. C.K. Kwok.).

CHANDRASHEKHAR, S. "An Analytical and Experimental Stochastic Modelling of the Resultant Force System in BTA Deep-Hole Macnining and Influence on the Dynamics of the Machine Tool Work-Piece System", 1984. (Supervisors: Dr. M.O.M. Osman and Dr. T.S. Sankar).

MASTER OF ENGINEERING GRADUATES (June 1, 1983 to May 31, 1984).

AHMAD, Z. "Theoretical and Experimental Study of the Stability of Cylindrical Converging Shock Waves", 1984. (Supervisor: Dr. R.A. Neemeh).

ARVANITIS, S. "Finite Element Analysis of Tapered Power Transmission Shafts Experiencing Bending, Axial and Torsional Vibrations", Technical Report, 1984 1984. (Advisor: Dr. G.D. Xistris).

ATHANASOULIAS, D. "Computer-Aided Simulation of Relay Logic Circuits Using Interactive Graphics", 1984. (Supervisors: Dr. R.M.H. Cheng and Dr. S. LeQuoc).

BOUTET, J. "Graphical Method for Straightening of Long Cylindrical Sections", Technical Report, 1983. (Advisor: Dr. J. Svoboda).

HOW CHEEFAH, R. "Flow Deviation in an Axial Compressor Blade", Technical Report, 1983. (Advisor: Dr. W.G. Habashi).

CAVazzoni, E. "Design Optimization and Performance Evaluation of a Gravity Check Valve for Gas Service", 1984. (Supervisor: Dr. J. Svoboda)

DANIEL, B. "Selection Methods and Computer Models for Capillary Tubes", Technical Report, 1984. (Advisor: Dr. R.A. Neemeh).

GEORGANTAS, A. "Experimental Investigation of Confined Vortex Flow in a Cylindrical Chamber of Aspect Ratio 1.5", 1983. (Supervisors: Dr. T. Krepec and Dr. C.K. Kwok).

GOITIA PARRA, A. "A Study of a Servovalve Controlled Hydraulic Radial Ball Piston Motor", 1983. (Supervisors: Dr. G.M. McKinnon and Dr. J. Svoboda).

GORING, O. "A Method of Generating Low Temperature, Supersonic Flow", Technical Report, 1985. (Advisor: Dr. R.A. Neemeh).

GREISS, R.J. "Evaporating Fuel to Improve Spark Ignition Engine Efficiency", Technical Report, 1983. (Advisor: Dr. A.J. Saber).

GREWAL, S. "A Time Series Methodology to System Modeling and Analysis", Technical Report, 1985. (Advisor: Dr. V. Latinovic).

ABDOL-HAMID, K.S. "Behaviour and Fault-Loading Methods of a Train-Line With Leakage", 1983. (Supervisor: Dr. R.M.H. Cheng).

HONG, H. "The Design of Wafer Swing-Disc Check Valves for Optimal Performance", 1983. (Supervisor: Dr. J. Sloboda).

ISHAK, W. "Fiber Reinforced Plastic Pressure Vessels", Technical Report, (Advisor: Dr. S.V. Hoa), 1984.

JONES, R.B. "Damping of Composite Materials in Relation to Aircraft Interior", Technical Report, 1983. (Advisor: Dr. S.V. Hoa).

JUDEK, T.J. "Computer Aided Engineering Concept in the Design and Analysis of an Off-Road Motorcycle Suspension and Frame", 1983. (Supervisor: Dr. S. Sankar).

KENAWY, N. "Use of Composite Materials in Gas Turbine Engines", Technical Report, 1985. (Advisor: Dr. S.V. Hoa).

KONIDIS, J. "Design of Direct Heated Rotary Dryers", Technical Report, 1984. (Advisor: Dr. G.D. Xistris).

LIMAYE, A.M. "Design and Development of a Novel Electrohydraulic Servovalve Configuration" 1984. (Supervisor: Dr. S. LeQuoc).

MELO, J.A. "A Flutter Damping Technique for Aircraft Surface Control Hydraulic Actuators", Technical Report, 1985. (Advisor: Dr. R.M.H. Cheng).

MAH, S. "The Formulation and Numerical Solution of the Coupler Curve Equations for a Multi-Link Planar Mechanism with Multiple Design Parameters", 1984. (Advisor: Dr. M.O.M. Osman).

MEIMARI, M.R., "Nitrogen-Base Furnace Atmospheres - Application in Annealing of Carbon Steel Wire", Technical Report, 1984. (Advisor: Dr. S.V. Hoa).

PAPAZOGLOU, K. "High Strength Rail Steels", Technical Report, 1983. (Advisor: Dr. H.J. McQueen).

RAMAMOORTHY, G. "Boiler Tube Failure Due to Corrosion and the Mechanical Aspects Affecting Boiler Design", Technical Report, 1985. (Advisor: Dr. A.J. Saber).

SETIAWAN, P. "Experiments on Compressor Cascades Using a Helium-Driven Shock Tube", 1984. (Supervisor: Dr. R.A. Neeme).

SHARAN, M.M. "Determination of Gearing Life in Bending Fatigue for a Multi-Branched Linear Torsional System Subjected to Random Loading Environment", 1984. (Supervisors: Dr. T.S. Sankar and Dr. G.D. Xistris).

SHAHABI, M. "Stall in Axial Compressors". Technical Report, 1983. (Advisor: Dr. R.A. Neeme).

STAMPFLI, M. "Motion Compensating Crane Simulation and Testing", Technical Report, 1984. (Advisor: Dr. J. Svoboda).

TAHA, S.H. "Advanced Materials for Gas Turbines", Technical Report, 1984. (Advisor: Dr. S.V. Hoa).

TOULOUMENIDIS, V. "Time Varying Orifice in a Discharging Reservoir", Technical Report, 1985. (Advisor: Dr. R.M.H. Cheng).

WALY, U. "Development of Rolling and Controlled Cooling Process for Wire Rod Manufacturing", Technical Report, 1983. (Advisor: Dr. W.G. Habashi).

WONG, T.T. "Elastic and Creep Buckling Analysis of Load Carrying Columns by the Finite Element Method", Technical Report, 1983. (Advisor: Dr. S.V. Hoa).

Grantee	RESEARCH GRANTS		Granting Agency
	1983/84	1984/85	
(a) Individual Operating Grants			
Bhat, R.B.	\$14,840	\$15,582	NSERC
Blach, A.E.	14,840	15,582	NSERC
Cheng, R.M.H.	29,383	39,088	NSERC
Habashi, W.G.	37,259	39,122	NSERC
Hashish, E.		12,800	NSERC
Hoa, S.V.	17,914	48,610	NSERC
Krakow, K.I.	2,120	16,828	NSERC
Krepec, T.H.	18,762	19,700	NSERC
Kwok, C.K.	46,004	48,304	NSERC
Latinovic, V.	7,420	7,420	NSERC
Lequoc, S.	6,360	14,172	NSERC
Lin, S.	67,995	62,706	NSERC
McKinnon, M.	20,140	21,147	NSERC
McQueen, H.J.	18,338	19,255	NSERC
Neemeh, R.A.	15,317	16,083	NSERC
Osman, M.O.M.	40,280	42,294	NSERC
Sankar, S.	25,175	77,034	NSERC
Sankar, T.S.	32,754	41,892	NSERC
Stepanenko, Y.		12,380	NSERC
Svoboda, J.	15,910	20,364	NSERC
Thulasiraman, K.	13,568	16,500	NSERC
Xistris, G.D.	16,006	16,806	NSERC
(b) Group Operating Grants			
Kwok, C.K. (Group: R.M.H. Cheng J. Svoboda T. Krepec	28,000	20,873	DGES-FCAC
Osman, M.O.M. (Group: T.S. Sankar G.D. Xistris S. Sankar R.B. Bhat V. Latinovic	39,300	34,945	DGES-FCAC
Hoa, S.V. (Group: A.E. Blach S. Feldman H. McQueen T.S. Sankar	11,000	13,555	DGES-FCAC
Thulasiraman, K. & Swamy, M.N.S.		13,555	DGES-FCAC
McQueen, H.J. (Group: J. Jonas, M.G. Akben	19,000		DGES-FCAC

	<u>1983-84</u>	<u>1984-85</u>	
(c) Equipment Grants			
Kwok, C.K. (Group: R.M.H. Cheng, T. Krepec, J. Svoboda	8,000		DGES-FCAC
McQueen, H.J.		13,000	NSERC
Osman, M.O.M. (Group: R. Bhat, S. Hoa, V. Latinovic, S. Sankar, T.S. Sankar, G.D. Xistris.	8,000		DGES-FCAC
Cheng, R.M.H. (Group: S. Sankar S.V. Hoa, S. Suen, E.J. Doedel, C. Lam and R. DeMori)	35,980		NSERC
Habashi, W.G.		96,192	NSERC
Hoa, S.V. (Group: A.E. Blach, S. Lin, H. McQueen, T.S. Sankar)	39,177		NSERC
Hoa, S.V.		2,300	FCAC
Krepec, T.H. (Group: R.M.H. Cheng, C.K. Kwok, S. Lin, J. Svoboda)	32,778	43,600	NSERC
Thulasiraman, K.		2,500	FCAC
Svoboda, J. and G.M. McKinnon	39,580		NSERC
(d) Special Grants			
Habashi	56,500		NSERC PRAI
Hoa, S.V.	52,200		NSERC PRAI
Lin, S. & Krakow, K.	46,583	40,223	NSERC STRATEGIC
Sankar, S.	88,000		NSERC PRAI
Svoboda, J.		193,500	NSERC PRAI
Cheng, R.M.H. (with Drs. Hoa, T.S. Sankar, S. Sankar, Suen, Lam, McKay, Doedel, deMori)	43,000	45,150	NSERC INFRA- STRUCTURE
Hoa, S.V. & Sankar, T.S.	30,000		NSERC STRATEGIC
Sankar, S.	50,600		NSERC STRATEGIC
Stepanenko, Y. & Sankar, T.S.	57,100		NSERC STRATEGIC
Sankar, T.S.	5,000		CICI
Sankar, T.S.	2,000		RVH
Sankar, T.S.	7,500		NSERC EXCHANGE
Vatistas, G.	4,600		CASA

<u>Grantee</u>	<u>1983-84</u>	<u>1984-85</u>	<u>Granting Agency</u>
<u>(e) Other Grants & Contracts</u>			
Bhat, R.B.	\$ 680		CASA
Bhat, R.B.		46,860	CDTM
Blach, A.E.		5,100	WRC
Blach, A.E.	477		CASA
Blach, A.E.	501		CASA
Cheng, R.M.H.	680		CASA
Gunter, R.		379	GRG
Hoa, S.V.	450		CONCORDIA UNIVERSITY TEACHING & DEVELOPMENT
Hoa, S.V.	2,500		SPAR AEROSPACE
Hoa, S.V.	390		CASA
Hoa, S.V.	8,000	8,000	IMPERIAL OIL
Hoa, S.V.		30,207	COND
Krepec, T.	680		CASA
Lin, S.	269		CASA
McQueen, H.J.	1,800		NSERC TRAVEL GRANT
McQueen, H.J.		11,834	NSERC CONFERENCE GRANT
Neemej, R.A.	660		CASA
Saber, A.J.		19,926	DEPT. OF NATIONAL DEFENCE
Saber, A.J.	47,703	19,790	DEPT. OF NATIONAL DEFENCE
Saber, A.J.		80,532	DEPT. OF NATIONAL DEFENCE
Sankar, S.	10,170		NSERC SENIOR INDUSTRIAL FELLOW
Sankar, S.		104,000	NSERC/BOMBARDIER
Sankar, T.S.	680		CASA
Svoboda, J.	15,000		CANADIAN AVIATION ELECTRONICS
Svoboda, J.	6,000	6,000	RITEPRO

HONOURS, AWARDS AND FELLOWSHIPS

UNDERGRADUATE AWARDS (1983-85)

i) The Mechanical Engineering Medal

Convocation 1984 - Chi Leung Poon, B.Eng.
Convocation 1985 - Gregor Rohrauer, B.Eng.

ii) Fellowships and Scholarships

Cong Hiep To	The American Association of Costs Engineers (1981/82).
Ngoc Lan Vu	Birks Family Foundation Bursary (1981/82; 1982/83).
M. Marciano	J.P. Copland Memorial Bursary (1981/82).
Jane Andrews	Ethel Campbell-P.E.O. Memorial Bursary (1980/81).
Gregor Rohrauer	R.L. Weldon Scholarship (1985).
David Wilson	James McQueen Scholarship (1985)

iii) NSERC Undergraduate Summer Research Awards

<u>1983</u>	<u>1984</u>
G. Rohrauer	Cong Hiep To
Cong Hiep To	A. Gee
Ngoc Lan Vu	G. Guévremont
John Zalass	S. Mah
A.A. Ortaaslan	Bao Q. Nguyen
	R. Krepec
	R. Pellizzari
	T. Veto
	Ngoc Lan Vu

iv) Undergraduate Honours Students (with distinction)

Kevin Gerald Conrod, B.Eng. 1984
Anthony Doon-Leung, B.Eng. 1984
Domenico Iannuzzi, B.Eng. 1984
André Laberge, B.Eng. 1984
Chi Leung Poon, B.Eng. 1984
André Karl Sokalski, B.Eng. 1984
Hiep Cong To, B.Eng. 1984
Ricardo Alexander Caramelli, B.Eng. 1985
Michael Ronald Dufort, B.Eng. 1985
Albert Lisio, B.Eng. 1985
Gregor Leo Rohrauer, B.Eng. 1985
David Herbert Wilson, B.Eng. 1985
Sandra Young, B.Eng. 1985
John Zalass, B.Eng. 1985

GRADUATE AWARDS (1983/85)

i) NSERC Post Graduate Awards

A.K.W. Ahmed (1983-84)
Grant Guevremont (1983-85)
William Lucking (1984-85)
Stephen Mah (1983-85)
Lawrence McLean (1983-84)
Bao Q. Nguyen (1983-84)
Huan M. Nguyen (1983-84)
André Sokalski (1984-85)
Viswanath Tata (1983-84)
Cong Hiep To (1984-85)

NSERC Postdoctoral Fellowship

Mark Van Vliet (1984-85)

ii) Government of Quebec Post-Graduate Scholarships

Grant Guevremont
Michael Lucking
Stephen Mah
Bao Q. Nguyen
Subash Rakheja
T. Tebelis
Mark Van Vliet

iii) Transport Canada Scholarships

W.K. Ahmed
S. Rakheja
Bao Q. Nguyen

iv) Concordia University Graduate Fellowship

Chi-Leung Poon

OTHER AWARDS

Concordia Graduate Awards Travel Grant - Michael Lucking - July 1983.

SPECIAL INVITED LECTURERS AND INDUSTRIAL SEMINARS

Dr. André Biron	Department Mechanical Engineering, Ecole Polytechnique.
Dr. Ashwani K. Gupta	College of Engineering, Glen L. Martin Institute.
Dr. Roger B. Hamel	Compagnie Pétroliere Impériale Ltée, Montreal.
Dr. A. Satyanarayana	Dept. Mathematics and Computer Science, Univ. of Wisconsin.
Dr. A.V. Srinivasan	United Technologies Research Center, East Hartford.
Dr. Jerzy T. Pindera	Institute for Experimental Mechanics, Waterloo, Ontario.
Dr. S.C. Lakkad	Indian Institute of Technology, Bombay.
Dr. J.T. Fowler	Monsanto Company, St. Louis, Missouri.
Dr. J. Zierep	Institute for Fluid Mechanics, Karlsruhe, West Germany.
Dr. Ronald L. Huston	Dept. of Industrial Engineering, University of Cincinnati.
Dr. David J. Ewins	Imperial College of Science and Technology, London, England.
Dr. Andrew Kusiak	Technical University, Halifax, Nova Scotia.
Dr. M.A. Daoud	Spar Aerospace Limited, Montreal.
Dr. S. Tarasiewicz	Université du Québec à Chicoutimi.
Dr. S. Ramani	National Institute for Training in Industrial Engr. Bombay.
Dr. Ahmad Hemami	Dept. of Mechanical Engineering, Ecole Polytechnique.
Detective F.M. Lemieux	Explosives Disposal, Peel Regional Police, Ontario.
Dr. N.G.R. Iyengar	Visiting Professor, Aerospace Engineering, Univ. of Arizona.
Mr. Gary Wagner	Co-Pilot, Boeing 767, Air Canada
Mr. Frank Vigneron	Communications Research Centre, Ottawa
President Chen Zhi Hong and his delegation	Shanghai Institute of Mechanical Engineering, Shanghai